

CHAPTER 18

PROTECTION AND MITIGATION OF NATURAL FEATURES

- 18.01** The preservation and enhancement of natural features is essential to maintaining Ann Arbor Township's character, its ecological diversity and stability, its economic well-being, its educational opportunities and its quality of life. The purpose of this chapter is to assist petitioners, reviewers, decision makers, and the general public in understanding how natural features may be identified, evaluated, protected, and mitigated on sites being reviewed by the Planning Commission. "Natural features" are defined to include (A) wetlands, (B) watercourses, (C) floodplains, (D) woodlands, (E) landmark trees, (F) steep slopes, (G) threatened or endangered species habitats and (H) ground water recharge areas.
- 18.02** Federal, state and local governments have laws, rules and regulations governing natural features which often require licenses, permits or approvals for development in or affecting these natural features, which may change from time to time. Licenses, permits or approvals required by and obtained from Ann Arbor Township shall not relieve a person of the need to obtain applicable licenses, permits or approvals from other applicable jurisdictions; nor shall the issuance of licenses, permits or approvals from another applicable jurisdictions relieve a person of the need to obtain licenses, permits or approvals required by Ann Arbor Township.
- 18.03** When natural features exist on a site proposed to be developed, the petitioner will be required to do the following:
- a) **Natural Features Determination.** The petitioner contemplating a project requiring Township review is responsible for determining whether natural features exist on the site. This determination can be made by outside professional consultants retained by the petitioner. Township staff and Planning Commission will confirm these determinations during the review process. This determination shall be part of the preliminary site plan or preliminary plat (tentative approval) processes.
 - b) **Preparation of Required Plans.** The Land Development Standards specify what information must be shown on plans submitted for Township review. Prior to submitting a plan, the petitioner should meet with Township staff to review the proposed site layout and consider suggestions for complying with Township requirements. In addition, petitioners may wish to consult with experts on questions regarding the type, extent, quality, and management needs of natural features, and on the impacts of various design approaches on these features.
 - c) **Plan Submission.** Once the petitioner submits the required plans and supporting information and pays the necessary fees, the proposal will be scheduled for Township Planning Commission review. When at least one natural feature is determined to exist on a site, a Natural Features Impact Statement must be provided as part of the preliminary site plan or preliminary plat (tentative approval) process. The

statement will contain the following information:

- 1) **A site inventory map.** This map must clearly show the locations and types of existing natural features both on the site and those within a region 100 feet beyond the property lines. The drawing should delineate edges of woodlands and wetlands, show buffer areas, show watercourse streambanks, pond ordinary high water marks, floodways, floodplains, areas of hydric soils, highly permeable soils, groundwater recharge areas and steep slopes. Landmark trees on the site should be located by numbered dots, with an accompanying database table of corresponding specie and size listings. The site inventory should contain a written description of the quality, character and health of the natural features.
- 2) **A natural features protection plan.** This plan must delineate natural features to be retained on the site or excluded from development. Lines should show the limits of soil disturbance expected on the site. Protective measures such as barrier fencing, restrictions on traffic and storage of materials under trees, soil erosion control measures, etc. are also to be shown on site plan submissions. In some cases, this plan may include information on how the retained natural features are to be sustained on the site.
- 3) **An alternatives analysis.** A report will be made which displays and discusses the alternatives approaches and designs that were considered in arriving at the design proposed, in an effort to minimize disturbance to natural features on the site. A written justification must be made as to why the design proposed must cause the degree of disturbance to natural features planned, and explaining how the mitigation proposed is a wise course of action.
- 4) **A mitigation plan.** In situations where "as is" preservation of natural features is not required by the Township Planning Commission or Board of Trustees and mitigation in the form of replacement is permitted under the following particular natural features protection and mitigation guidelines, a mitigation plan shall be submitted to the Ann Arbor Township Planning Commission. A mitigation plan to replace natural features shall be considered to be a proposal which is subject to approval by the Ann Arbor Township Planning Commission. Where natural features are present and their preservation is required "as is" under natural features protection guidelines, a mitigation plan shall not be required and the natural features shall not be disturbed or taken. A proposed mitigation plan shall be included as part of the site plan or plat and shall include:
 - a) a written description of the proposed mitigation program;
 - b) replacement calculations;
 - c) planting plan, showing the location of trees, shrubs, and ground cover;
 - d) planting list, including botanical and common names, caliper sizes, root type and height;

- e) timing schedule for the implementation of the mitigation measures; and
- f) at least the minimum elements set forth under each particular natural features protection and mitigation guidelines, where mitigation is applicable.

18.04 Natural Feature Protection and Mitigation Guidelines

The following sections discuss each of the eight (8) natural features in detail. Each feature is discussed with respect to:

1. A summary of key facts.
2. Means to identify, differentiate and evaluate the natural feature.
3. Protection and restoration strategies
4. Guidelines for mitigation, if "as is" preservation of natural features is not required and mitigation is permitted.

A) Wetlands

A.1) Key Facts

The Township's original wetlands were open meadows, predominantly fen/wet meadow ecosystems associated with watercourses tributary to the Huron River. There were also pocket wetlands, often only showing water in the spring and during wet summers, throughout the flat forested landscape.

Some wetlands remain. They can exhibit characteristics of their original ecosystems (which can be seen by the presence of sedges and forbs if they are open meadows, or by woodland pond species if in native forest fragments). More likely, the wetlands which remain are highly disturbed and are dominated by only a few common species of plants (cattail or exotic loosestrife), or they have been overwhelmed by invasive exotics including buckthorn, willows and poplars.

A.2) Identification.

Wetlands are visible in low altitude aerial photos, particularly older ones prior to the invasion by exotic shrubs and trees. The boundaries of wetlands are further determined by considering vegetation and soils in the field. Generally speaking, current wetlands are quite plainly visible in the field. Long drained wetlands are far more difficult to see, but can be discovered.

A.3) Protection and Restoration Strategies .

A.3.1) A permanent buffer strip, vegetated with natural plant species, will be maintained

or restored around the periphery of wetlands. Development around wetlands should be set back at least 25 feet from the boundary or edge of a wetland.

- A.3.2)** All wetlands should be considered for protection but especially forested wetlands and wetlands along watercourses, with native plant associations still intact or regenerating. These habitats should be carefully protected from development.
- A.3.3)** Natural wetlands may be used as storm water retention ponds, however, when natural wetlands are used in this way they will be protected from damaging modifications and adverse changes in runoff quality and quantity associated with land developments. Direct discharge of untreated stormwater into a natural wetland is prohibited. All runoff from the development will be pre-treated by sedimentation traps and/or basins to remove sedimentation and other pollutants prior to discharge in a wetland. Such treatment facilities will be constructed before property grading begins. Site drainage patterns will not be altered in any way that will modify existing water levels. Wetland construction, re-construction, or modification will be overseen by a qualified professional with specific wetland experience.
- A.3.4)** Disturbed wetlands with underlying hydric soils, such as on once farmed lands constitute genuine opportunity to restore some of the capacity and function and diversity of species. Maintaining and enhancing the biological and hydrological value and function of these wetlands should be the primary concern. Use of these wetlands as retention basins can be acceptable, as long as there are separate filtration basins and as long as the volumes of water involved do not overwhelm the plant life which must be sustained in the wetland.
- A.3.5)** Some wetlands have been greatly damaged and have been reduced to open water and/or a few species of plants and animals. Replacement or relocation of these wetlands is more acceptable, if they must be taken for development. In many cases, these wetlands can be effectively repaired and used for storm water retention and filtration.
- A.3.6)** Where wetlands are to be used as part of a stormwater retention system, the Rules of the Washtenaw County Drain Commissioner (April 1996) should be followed to minimize negative impacts on the wetland.
- A.3.7)** Wetlands will be protected during construction by appropriate soil erosion and sediment control measures. Barrier fencing should be used during construction.
- A.3.8)** All activity in or discharge into regulated wetlands must be approved by MDEQ.

A.4) Mitigation.

Mitigation shall not be considered a substitute for making all prudent attempts to avoid wetlands impacts. Where wetland losses are unavoidable, mitigation plans shall be considered only if the following criteria are met:

- a) The mitigation plan provides for substantial replacement of the predominant value of the wetland to be lost.
- b) Mitigation shall be provided on-site where practical and beneficial to the wetland resources.
- c) If mitigation on-site is not practical and beneficial, then mitigation in the immediate vicinity, within the same watershed of the permitted activity, may be considered.
- d) Only if all of these options are impractical shall mitigation be considered elsewhere.
- e) Mitigation shall be a minimum ratio of 1.5 new acres to 1 lost acre.

B) Watercourses

B.1) Key Facts

Watercourse refers to any water feature that is confined to banks and includes lakes, ponds and channelized flows, such as rivers and drains. Watercourses provide habitat for species, create wildlife corridors, are potential sources of drinking water (Barton Pond), can serve as critical zones of groundwater recharge, are areas of scenic beauty, and are used for recreation. Watercourses can be damaged during development activities by altering the natural features surrounding the watercourse, and by the contribution of sediments and contaminants. Protection of slopes, woodlands, and wetlands adjacent to watercourses combined with land use planning to reduce stormwater runoff are essential to maintain appropriate water quality and quantity. Ann Arbor Township seeks to preserve the existing natural watercourses and encourages the restoration of damaged watercourses.

The surface hydrology of Ann Arbor Township results from the glacial landforms present, and the soil characteristics. The morphology of stream channels depends upon the type and permeability of the soil, the vegetative cover, and the slope of the land adjacent to the watercourse. Channel shape can be altered by an increase in stormwater runoff from impervious surfaces, so extreme care should be taken to ensure that the quantity of water flowing to the channel does not exceed the physical ability of the stream to absorb the flow. Development projects should be reviewed in the context of both the stream channel and the watershed. A watershed incorporates not only the watercourse, but also includes all of the land which contributes flow through runoff or subsurface flow to the stream. Ann Arbor Township is located in the Huron River Watershed. The Huron River flows through the northwestern portion of Ann Arbor Township, then through the City of Ann Arbor, and the southeastern portion of the Township. Numerous tributary streams are located throughout the Township.

Construction of structures in watercourses is regulated by both Federal and State statutes, and may require a permit from either the United States Army Corps of Engineers or the

Michigan Department of Environmental Quality.

B.2) Identification

Watercourses may be identified by field observation, on United States Geological Survey Topographic Maps, and on aerial photographs. Many watercourses are clearly delineated on Flood Insurance Rate Maps produced by the Federal Emergency Management Agency. However, some small features may be difficult to locate using maps, and may require field observation for identification. Watercourses should be identified as the top of the bank of the channel carrying water or as the ordinary high water mark line of a pond. Watercourses may be associated with other valuable natural features, such as woodlands and wetlands.

B.3) Protection and Restoration Strategies

B.3.1) Efforts should be made to preserve watercourses in a natural state. Stormwater and sedimentation can damage the watercourse. Controlling stormwater in watersheds will ensure that watercourses are not damaged and eroded during storm events. Development options should be explored that will reduce the adverse impacts of both stormwater and sedimentation.

B.3.2) The following watercourses should be preserved in any development proposal: (1) watercourses with natural areas around them, such as wetlands or woodlands, (2) watercourses integrated into steep terrain, and (3) watercourses still flowing in natural channels. When the watercourses listed above are located on a project site, efforts must be made during the design phase to ensure that these watercourses and adjacent buffer areas are protected.

B.3.3) A permanent buffer strip, vegetated with natural plant species, will be maintained or restored within a twenty-five (25) feet setback from the highwater mark of any watercourse. Buildings and construction activity should be setback at least one-hundred (100) feet from the highwater mark of any watercourse. This set back is provided to ensure on-site run off into watercourses is filtered naturally and to maintain a corridor for wildlife along stream ways. Building and construction setbacks may vary depending on site specific characteristics such as soil types, slopes, vegetation and the size and hydrology of the water course. Alternatives to the one-hundred (100) feet setback must be described and justified in the natural features protection plan. When watercourses are crossed, effort must be made to ensure that the crossing occurs at the location where there is the least physical, scenic, and biologic impact upon the watercourse and its surrounding natural features. Crossing locations should be kept to the minimum necessary to provide access.

B.3.4) Urbanized above-ground watercourses are ones that no longer have much of a natural character, but which nonetheless have not been dumped into a storm drain beneath the ground. These watercourses may or may not have other important natural features surrounding them. Whenever possible, development projects

should incorporate restoration of these watercourses and the associated natural feature. Effort to control erosion, sedimentation and contamination problems is required, as is the connection of natural corridors across properties.

B.3.5) Underground (piped) watercourses are directly related to major storm drains, and are often quite easy to find either by following valleys or by observing where flooding occurs after storm events. This potential for flooding is a major concern, and development projects must be designed to minimize the potential for flooding. An additional concern is the potential for increased flow to the watercourse, which may increase erosion and result in physical alteration of the watercourse (refer to the Rules of the Washtenaw County Drain Commissioner, April 1996). The planning phase of the project should recognize that these watercourses are connected to surface drains and address stormwater and peak flow rates through these watercourses. Restoration of the surface watercourse is desirable and these efforts may assist in stormwater control.

B.3.6) All watercourses are important to protect. Tolerance for soil erosion on any construction site in or near any watercourse is low. Special, effective soil erosion and flood protection techniques must be devised and implemented during and after construction.

B.3.7) Every development project should evaluate the potential damage to nearby watercourses during the design, construction, and implementation phases to minimize problems associated with surplus stormwater, sedimentation, and contamination.

C) Floodplains

C.1) Key Facts

Floodplains serve to minimize damage to land and water resources because of their capacity to store water. They also protect downstream properties from flooding. In so doing they control erosion, silting and contamination of water features and aquatic wildlife. Healthy, stable plant life is important in determining a floodplain's capacity and function in slowing, filtering, and cooling water moving through them. Floodplains are not a desirable location for stormwater retention facilities.

Floodplains also may qualify as wetland or watercourse natural features. With watercourses and other surrounding natural features, floodplains serve as vital wildlife reserves and linking corridors for important populations of plants, animals, aquatic organisms, and natural associations.

C.2) Identification

Floodplains are areas that are low lying and adjoining to a lake, stream, river or pond that receive excess water from flooding. They are also natural flood spaces for stream

overflow during intense rainstorms. The 100 year floodplain is the boundary of overflow during a one hundred year storm. This means that the likelihood of this storm occurring is one percent during any given year. On the average, this storm will occur once every hundred years. Floodplains, floodways and watercourses that have watersheds 2 square miles or larger are officially mapped and regulated under provisions of Federal and State statutes. Floodplain and floodway boundaries are available on Flood Insurance Rate Maps (FIRM), produced by the Federal Emergency Management Agency (FEMA). Unless it can be shown that flooding is not relevant, the Township requires investigation and mapping of flooding zones along watercourses on sites not officially mapped.

C.3) Protection and Restoration Strategies

C.3.1) All floodplains are vital open spaces that protect downstream properties from flood damage and control soil erosion and contamination. No building shall occur within the 100 year floodplain. Proper soil erosion control measures shall prevent unfiltered runoff into the floodplain.

C.3.2) Floodplains with natural plant life and natural landform conditions are very important to protect from development. They involve native floodplain forest fragments, or native sedge or fen meadows. These areas not only are rich biologically, but provide superb floodplain function.

C.3.3) The original floodplain forests were populated by red ash, black and silver maple, and hickories. In disturbed conditions these forests include sycamore, elm, cottonwood and native willows. Many endangered species found are in the fen and sedge meadow habitats. As meadows, these landscapes are highly unlike the vast majority of lands once present in this area.

C.3.4) These habitats should be preserved. There should be no disturbance to surface and subsurface hydrological regimes. In cases where these habitats exist and are being invaded by exotics, every reasonable effort should be taken to restore the habitat as part of a development proposal.

C.3.5) Forested floodplains dominated by exotics, including black alder, several willows, and poplars, and flood-plain meadows dominated by cattails or purple loosestrife may not be as important to protect for their biological value. But they are vital to the continued function/capacity of the floodplain. Whenever possible, these areas should be left undisturbed. In many cases, restoration of these areas with native plants could be useful in enhancing the function, appearance, and wildlife value of the floodplain.

D) Woodlands

D.1) Key Facts

The Township's woodlands are of two primary types, either planted and volunteer, or naturally regenerating native forest. A substantial majority of the land area of the Township was cleared of stumps and all herbaceous vegetation for European style farming. As the Township has urbanized, farmed land has been developed and planted with a wide variety of ornamentals, often so densely as to qualify as woodlands. Where farmlands have been abandoned but not yet developed, volunteer species of trees and invasives rapidly colonize, often so densely as to qualify as woodlands. Some native species managed to regenerate in these areas, but often seed stocks and microflora in the soil necessary for direct regeneration of forests as they existed in the 1800's were destroyed by the farming and urbanization processes.

These native forest fragments and old trees are very important to the scenic and biological quality of life in the Township. These areas can simply be a grove of native trees much older than the houses and gardens under them. Or they can be regenerating ecosystems (trees in the canopy, dogwoods, shadblow and witch hazel in the understory, very few shrubs, and a diverse herbaceous flora). A survey of "Environmentally Significant Areas of Ann Arbor Charter Township" was conducted by Ellen Weatherbee and published in 1994. This survey identified a number of important woodlands within Ann Arbor Township which should be preserved.

D.2) Identification

Native forest fragments are clearly visible on early low altitude aerial photographs of the Township, before the invasion of exotic woody plants. These fragments can be floodplain forests (Black and Silver maples, Red ash, hickories), wooded mesic or wetland forests (red oak and red maple), dry forests on the tops of sand and gravel filled moraines and kames (White oak, Hickories and White ash), to mesic forests on moister upland soils (Sugar maple, Red maple and American beech). A very wide variety of species exist as part of these associations, and can be present in the regenerating fragments.

Cultivated woodlands, whether maintained or not, are areas which qualify under standard measuring milar overlays, but which are not native forest fragments. Groves of planted trees, often of pines or spruces are found. Volunteer trees may come into an area so densely as to create a woodland under the definition. Some people may plant and cultivate trees densely enough to qualify. These landscapes do not function as self-sustaining ecosystems, but they can function as valuable wildlife habitat, can provide great scenic resource, influence the climate, and make life in the Township far more enjoyable for people.

Pioneer woodlands are those which arise on disturbed soils, such as soils which have gone through a period of cultivation in the European monocultural style, or soils which have been overturned, moved, or graded to the extent that seed (and the related, beneficial soil microflora) for regenerating the ecosystem is destroyed or greatly diminished. Pioneer woodlands are usually found on abandoned farm fields or waste

sites of various sorts.

D.3) Protection and Restoration Strategies

- D.3.1)** Native forest and forest fragments, particularly those that still have a wide diversity of native species at all levels (woody and herbaceous plants) are the most important sites to protect from development and from the impact of development. Many of these sites have been and are being rapidly invaded by exotic species (of shrubs, primarily), and need active care as well as protection to sustain them.
- D.3.2)** The highest quality among these forests and forest fragments should not be built upon. Effort should be made to preserve and protect all remaining native forest fragments to the fullest extent possible.
- D.3.3)** Cultivated woodlands are directly derived from people's planting activities around buildings. Woods and trees involved in these settings very likely have considerable importance to people who live near them, whether they are actively cultivated or not. Cultivated woodlands may have become important local ecosystems or scenic resources, in which case they should be preserved.
- D.3.4)** Generally speaking, pioneer woodlands that are now developing are often dominated by exotic trees and shrubs, with an occasional large native tree that a farmer retained in his field. Where appropriate, such woodlands provide an opportunity for restoration. Key Landmark Trees and other valuable features may exist on the site. If so, they would be key concerns in the design of development for these areas.
- D.3.5)** Native forest fragments excluded from development should be defended from all intrusions during development by well maintained barrier fencing.
- D.3.6)** Where native forest fragments are to be built in, but not completely removed, then those areas to be excluded from development should be clearly marked and/or fenced during the process. Grading, roads, walkways, utility lines, and all other aspects of soil disturbance should be minimized to the fullest extent sound design and public safety will allow.
- D.3.7)** Clearing for buildings should be strictly minimized to the least area needed to work around buildings. Excavated spoils from basements and other needed grading should not be spread on the site in the native forest fragment area. Very careful handling of trees near the building envelope should be undertaken to the fullest extent possible.
- D.3.8)** The most effective way to save trees is by planning ahead for their protection. Four steps will help accomplish this:
- a.** Delineate areas with severe limitations and stay away from

- them.
- b. Design the site to minimize grading/soil disturbance in the vicinity of retained trees.
 - c. Provide for adequate and effective stormwater management.
 - d. Design landscape installations to complement and honor retained trees.

D.3.9) Oaks, hickories, maples, beeches - many of the native hardwood trees and most old trees - do not adapt to construction changes. Therefore, the area of concern around an important tree may be very much larger than the Critical Root Zone (CRZ). The Critical Root Zone is defined as the circular area surrounding a tree which is considered to contain tree roots within 18 inches of the ground surface. The radius of the critical root zone is, in feet, the same numerical value as the tree's diameter at breast height (DBH) in inches, and is measured outward from the center of the tree. DBH is defined as the diameter of a tree measured four feet above the existing grade. For example, the critical root zone of a 12-inch DBH tree has a radius of 12 feet. Grading changes should neither increase or decrease moisture conditions in the Critical Root Zone.

D.3.10) In addition to protective fencing at the Critical Root Zone, a number of other construction techniques can help save trees. These include placing gravity utilities under pavement instead of under trees; tunneling utilities under trees instead of trenching; excavating by hand; and keeping heavy equipment and vehicle traffic away from the Critical Root Zone. The use of fill within the CRZ is discouraged. If fill is proposed it shall be fully described and justified in the natural features protection plan. In the event fill is allowed, it should be no more than one inch in height and the fill material shall be of a granular nature.

D.3.11) Any woodland that is determined to be dead, dying or severely damaged due to on-site construction activity within 3 years after issuance of a certificate of occupancy or final permit approval for development authorized by an approved site plan or plat shall be replaced by the applicant in the amount specified in the requirements for mitigation of woodlands. To ensure replacement of trees which are damaged, dead or dying, the natural features protection plan shall include a description of a proposed amount and type of security to be posted. The security shall be in the form of cash, surety bond or letter of credit and the amount will be approved by the Planning Commission. The security shall be provided by the applicant to the Township Clerk prior to issuance of a certificate of occupancy by the Zoning Inspector.

D.4) Mitigation

D.4.1) In general, native forests and forest fragments should not be removed for new developments. When portions of native forests, forest fragments or important cultivated woodlands must be removed, they should be mitigated by the installation of replacement trees or by the creation of an area planted with a

comparable plant associations. Replacement trees of species native to Michigan shall be provided to equal a minimum of 50 percent of the original DBH for each woodland tree 8 inches or larger, that is removed. Replacement trees shall be non-sterile varieties. The minimum size of a deciduous replacement tree shall be 2.5 inch caliper. The minimum size of an evergreen replacement tree shall be 5 feet in height. If more than 20 replacement trees are required, a mixture of 3 or more species must be used. Replacement trees required for mitigation purposes may also be counted as trees required for landscape purposes when appropriately located.

D.4.2) Where a valuable native forest fragment must be partly destroyed by development, the balance of the fragment should be actively managed as a natural area, to sustain it into the future. This includes the vitally important task of controlling invasive exotics.

D.4.3) Care should be taken during the development process to conserve top soils which must be disturbed on site, and to install plant materials into optimum conditions. Compacted soils placed by heavy machines are not suitable for successful establishment of many types of plants. Retained top soils can be used in new planting zones to great benefit.

E) Landmark Trees

E.1) Key Facts

Large, old, picturesque, rare, well-located, or otherwise special and interesting trees play an important role in the character of individual properties, and in the fabric of the Township as a whole. All the trees in the Township together have positive effects on the climate and the ability to attract and sustain wildlife, and its visual beauty. The 1994 survey of "Environmentally Significant Areas of Ann Arbor Charter Township" conducted by Ellen Weatherbee, identified a number of important Landmark Trees within Ann Arbor Township which should be preserved.

E.2) Identification

Trees which qualify as natural features are, generally speaking, any tree larger than 24 inches in diameter at breast height (DBH) and any tree of a size listed in the Landmark Tree List below.

Landmark Tree List

<u>Common Name</u>	<u>Scientific Name</u>	<u>DBH</u>
Ash	Fraxinus spp. (not cultivars)	18"
Basswood	Tilia spp.	18"
Beech	Fagus spp.	18"
Buckeye (Horsechestnut)	Aesculus spp	18"
Cedar of Lebanon	Cedrus spp.	18"

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Cherry, Black	Prunus serotina	18"
Elm	Ulmus spp.(except pumila)	18"
Fir	Abies spp.	18"
Fir, Douglas	Pseudotsuga menziesi	18"
Kentucky Coffee Tree	Gymnocladus dioicus	18"
Maple, Silver	Acer saccharinum	18"
Pine	Pinus spp.	18"
Spruce	Picea spp.	18"
Sycamore: London Plane	Platanus spp.	18"
Tuliptree	Liriodendron tuliperifers	18"
Walnut, Black	Julans nigra	18"
Hickory	Carya spp.	16"
Honey Locust	Gleitsia triacanthos	16"
Maple	Acer spp. (unless otherwise noted)	16"
Oak	Quercus spp.	16"
Arbor vitae	Thuja occidentalis	12"
Bald Cypress	Taxodium distichum	12"
Birch	Betula spp.	12"
Black Tupelo	Nyssa sylvatica	12"
Cherry, Flowering	Prunus spp.	12"
Crabapple (cultivar)	Malus spp.	12"
Dawn Redwood	Metasequiia glyptostroboides	12"
Eastern Hemlock	Tsuga canadensis	12"
Ginkgo	Ginkgo biloba	12"
Hackberry	Celtis occidentalis	12"
Hawthorn	Crataegus spp.	12"
Larch/Tamarack	Lrix spp.	12"
Pear	Pyrus spp.	12"
Persimmon	Dispyros virginiana	12"
Populus	Populus (except deltoides,alba)	12"
Sassafras	Sassafras albidum	12"
Sweetgum	Liquidambar styraciflua	12"
Yellow Wood	Cladrastis Lutea	12"
Cedar	Juniperus spp. & upright cultivara	8"
Eastern Redbud	Cercis canadensis	8"
Dogwood, Flowering	Cornus florida	8"
Hornbeam, Blue Beech	Carpinus spp.	8"
Ironwood	Ostrya virginiana	8"
Maple, Mountain/Striped	Acer spicatum/pensylvanicum	8"
Pawpaw	Asimino triloba	8"
American Chesnut	Castanea dentata	6"
Butternut	Juglans cinerea	6"

E.3) Protection and Restoration Strategies

- E.3.1)** Landmark Trees of most importance to protect are ones which are rare, unusual, old or historically significant. Certain trees may play a special role in the visual resources of a site or an area. If the trees are native to the Township, and are otherwise special, they are particularly important to protect. Such trees should be retained and used as a valuable and integral part of the new development's landscape.
- E.3.2)** The most effective way to save trees is by planning ahead for their protection. Tree areas with severe space and other limitations can be avoided, grading can be minimized or eliminated in tree areas, effective stormwater management facilities can be installed in a way to keep moisture levels in tree areas unchanged, and the design and installation of landscape elements (including irrigation) can be done in a way which honors the needs of protected landmark trees. Oaks, hickories, maples, beeches, many of the native hardwood trees and most old trees, do not adapt to changes caused by construction activity in the Critical Root Zone (CRZ). Therefore, the area of concern around a landmark tree may be much larger than the CRZ.
- E.3.3)** Tree roots are very vulnerable to disturbance. Trees generally do not have tap roots, nor a structure like what is above ground. They have a flat mat of roots extending within several inches to several feet from the surface of the ground and out a distance at least the diameter of the drip line of the tree. The most important roots are the fibrous ones, on the outermost ends of the root branches.
- E.3.4)** All construction activity including the effects on soil moisture and drainage of grading changes in the area) should be excluded from the Critical Root Zone (CRZ) of Landmark Trees to be excluded from development according to submitted plans. The expected survival rate for trees treated in this manner is extremely high. These activities damage or destroy tree roots and threaten the life of trees: Soil compaction from vehicle and machine parking and traffic, excavation or filling, storage of materials, grading changes that affect soil moisture in the root zone at any time, and insensitive landscape design and installation techniques (including irrigation). Barrier fencing shall be installed at the CRZ of Landmark Trees which are located within a disturbance area. Where encroachments into the CRZ are allowed as part of an approved site plan, the barrier fencing must be located at least 10 feet from the trunk of the tree at all points.
- E.3.5)** In addition to protective fencing at the Critical Root Zone, a number of other construction techniques can help save trees. These include placing gravity utilities under pavement instead of under trees; tunneling utilities under trees instead of trenching; excavating by hand; and keeping equipment and vehicles

away from the Critical Root Zone. The use of fill within the CRZ is discouraged. If fill is proposed it shall be fully described and justified in the natural features protection plan. In the event fill is allowed, it should be no more than one inch in height and the fill material shall be of a granular nature.

- E.3.6)** Any Landmark Tree that is determined to be dead, dying or severely damaged due to on-site construction activity within 3 years after issuance of a certificate of occupancy or final permit approval for development authorized by an approved site plan or plat shall be replaced by the applicant in the amount specified in the requirements for mitigation of Landmark Trees. To ensure replacement of trees which are damaged, dead or dying, the natural features protection plan shall include a description of a proposed amount and type of security to be posted. The security shall be in the form of cash, surety bond or letter of credit and the amount will be approved by the Planning Commission. The security shall be provided by the applicant to the Township Clerk prior to issuance of a certificate of occupancy by the Zoning Inspector.

E.4) Mitigation

- E.4.1)** In general, Landmark Trees should not be removed for development. Site design should consider any Landmark Tree on a site an important design element. Removal of Landmark Trees should occur rarely and should be considered only after alternatives are studied and found to be not feasible. Required or desired replacement should include the most appropriate, non-invasive species as part of the project design. Replacement requirements include using species native to Michigan and include using a diversity of species at a diversity of sizes. A replacement tree or combination of trees shall be provided to equal a minimum of 50 percent of the original DBH for each landmark tree that is removed. Replacement trees shall be non-sterile varieties. The minimum size of a deciduous replacement tree shall be 2.5 inch caliper. The minimum size of an evergreen replacement tree shall be 5 feet in height. If more than 20 replacement trees are required, a mixture of 3 or more species must be used. Replacement trees required for mitigation purposes may also be counted as trees required for landscape purposes when appropriately located.
- E.4.2)** Where trees are taken from a natural area, it is the natural area which should be replaced or restored at some other location, involving much more than just tree planting. Trees which go into such a project may need to be of much smaller size in order to find enough of the species needed to make a viable start to creating an ecosystem. .
- E.4.3)** Replacement trees need a chance to become as great as the trees they replace. Genuine concern for soils and cultural needs of new plants should be a part of the design process. Many species of trees will never thrive in compacted, fill soils - or in conditions not suitable for their optimum growth. Recognition observance of these realities is critical to successful replacement.

E.4.4) For each landmark tree that is removed without the approval of the Ann Arbor Township Planning Commission, the applicant shall provide a replacement tree or a combination of trees of a species native to Michigan equal to a minimum of 200 percent of the original DBH. Replacement trees shall be installed by the applicant prior to issuance of a certificate of occupancy by the Zoning Inspector.

F) Steep Slopes

F.1) Key Facts

Steep slopes can be associated with both glacial and fluvial features. Glacial landforms in Ann Arbor Township include recessional moraines, ground moraine, outwash and kames. Steep slopes may be located in recessional moraines and kames. The Fort Wayne Moraine and the Outer Defiance moraines are located in the northeastern and eastern portions of the Township. Recessional moraines are formed when the rate of glacial ice melting equals the rate of glacial ice accumulation, and glacial debris builds up in front of the ice creating a belt of hills with moderate to steep topography. Kames are formed when glacial meltwater carries sorted geologic material in cracks and crevices of the melting glacier. These accumulations of unconsolidated material remain as knobs after the glacier melts. Kames are steep sided and well drained. Steep slopes can also be created by erosion along stream channels. Many of the Township's current watercourses are in locations similar to those ancestral locations, and many of the scenically important slopes crafted in part by them are along the watercourses. Scenic qualities and concerns are associated with slopes, because the change in elevation creates views of and from locations on the slopes. Many of the best natural areas exist on steep slopes because of the difficulty for farming and development.

Steep slopes are prone to erosion if the vegetation on them is disturbed, or if surface runoff is directed toward them. As a result, disturbed slopes often result in siltation of a watercourse or disturbance to land below.

F.2) Identification.

Steep Slopes in Ann Arbor Township are identified in the Steep Slopes Map compiled by the Washtenaw County Metropolitan Planning Commission showing areas which contain a slope of 12% or greater (12 feet vertical distance per 100 feet of horizontal distance). Steep slopes that are located adjacent to the Huron River are particularly obvious. They rise fifty to one hundred feet above the river, and sometimes are steep inclines. These slopes also are often covered by native forest fragments, because they were too steep to clear and farm.

F.3) Protection and Restoration Strategies

F.3.1) Areas of steeper slopes, such as more than 12 percent, should be protected to reduce erosion potential, maintain slope and stability, control amounts and velocities of surface water runoff, and protect an aesthetic resource. In general,

slopes greater than 15% should be excluded from development. Slopes should be considered in terms of soil types as well as steepness. Where highly erodible soils are present special care must be taken.

F.3.2) Development that is permitted on steep slopes should maintain or enhance the natural contours, vegetation, and drainage patterns. Existing land form should be a major factor in the land-use and site-planning processes. The primary objective should be preservation of natural contours rather than alteration by mass grading.

F.3.3) Slopes of 40 percent or greater, facing or adjoining the river should be protected as key scenic assets. Where these slopes are visible from locations people frequent off the site, development on them can have dramatic impact upon the visual character. Such impacts (from buildings above the canopy of trees, for example) should be carefully considered.

F.3.4) A primary goal in protecting steep slopes is to prevent erosion and subsequent damage to natural features on and off the site. The use of retaining walls can reduce the amount of grading necessary, but are not encouraged (they are rarely durable structures). Underground utilities should not be located in steep slopes and certainly should not run lengthwise along them. Drainage should be directed to inlet structures and not be permitted to flow down slopes during and after construction.

G) Endangered Species Habitats

G.1) Key Facts

Endangered species habitat is the habitat necessary to maintain the existence of those plants and animals listed on the current Federal and State list of endangered, threatened or special concern species. Endangered species are most likely to be found in the midst of a natural area of considerable value. When a special concern, threatened, or endangered species is found, careful assessment should be made of the species and the area in which it is found. These organisms and their habitat may be intolerant of change caused by a development, such as change in hydrological conditions, even if the habitat itself is outside the limits of soil disturbance for a project. These species and their habitats are important to the Township for the richness and diversity of species they offer.

G.2) Identification

The "Natural Features Inventory" of the Department of Natural Resources records and regulates the Endangered, Threatened, and Special Concern plants, animals, birds, mammals, and insects. The areas most likely to contain endangered species are sandy, wet bottom lands and wetlands along the Huron River, along its tributaries, and in many small pocket wetlands in native forest fragments. Many of the areas can be quite small in size. Rare and unusual endangered species may also be found on disturbed ground -- including along shorelines and streambanks, flooded areas, old farmed fields, borrow

pits, eroding

slopes, burned areas, embankments along railroads and roads, in cemeteries, old settlement areas and farmsteads, etc.

The survey of "Environmentally Significant Areas of Ann Arbor Township" conducted by Ellen Weatherbee and published in 1994 contains the following listing of special concern and threatened species which have been found in Ann Arbor Township. This list should not be considered an exhaustive list of endangered, threatened or special concern species within the Township.

Special Concern and Threatened Species List

<u>Common Name</u>	<u>Latin genus/species</u>	<u>Latin Family</u>	<u>Status</u>
Burnet, American	Sanguisorba canadensis	Rosaceae	Threatened
Burning bush; wahoo	Euonymus atropurpurea	Celastraceae	Special Concern
Ginseng	Panax quinquefolium	Araliaceae	Threatened
Goldenseal	Hydrastis canadensis	Ranunculaceae	Threatened
Jacob's-ladders	Polemonium reptans	Polemoniaceae	Threatened
Lady-slipper, white	Cypripedium candidum	Orchidaceae	Threatened
Panic-grass, Leiberg's	Panicum leibergii	Poaceae	Threatened
Snakeroot, Virginia	Aristolochia serpentaria	Aristolochiaceae	Threatened
Twin-leaf	Jeffersonia diphylla	Berberidaceae	Special Concern
Valerian, taprooted	Valeriana ciliata	Valerianaceae	Threatened
Violet, green	Hybanthus concolor	Violaceae	Special Concern
Dace, redbside	Clinostomus elongatus	Fish	Threatened
Massasauga rattle snake	Sistrurus catenatus	Reptile	Special Concern

G.3) Protection and Restoration Strategies

G.3.1) The protection of Endangered species and their habitats is regulated by the State of Michigan (MDNR), in cooperation with the US Fish and Wildlife Service. The Township will work in coordination with state and federal regulating agencies to identify the best protection approach, based on the specific characteristics of the species involved. In general, these species and their habitats should be excluded from development and protected from the impact of development.

G.3.2) For those plant species which are not protected but highly desirable and within the road and sidewalk easements of newly approved developments, the petitioner might consider a cooperative partnership with a volunteer organization and the guidance of the Township whereby transplanted of these species could occur in an orderly fashion.

H) Groundwater Recharge

H.1) Key Facts

A groundwater recharge area is land which readily permits water to move from the surface into a groundwater system. Groundwater recharge areas perform the following functions: 1) Groundwater serves as drinking water for half of Michigan's residents and most of Ann Arbor Township's residents. The municipal wells for Barton Hills Village are recharged by groundwater flowing beneath the Township. 2) Groundwater provides a steady supply of cool, clean water to streams, rivers, lakes and wetlands. Half of the flow of the Huron River comes from groundwater. Studies show that, as the portion of a river's flow from surface water (water running off land and directly into the river) increases, floods and temperature increase, fish and other wildlife populations decline and water quality degrades. 3) Woodlands, wetlands and floodplains are often located over groundwater recharge areas. They provide a filtering system to groundwater. Development in these areas greatly diminishes this pollutant filtration function.

H.2) Identification

The Washtenaw County Metropolitan Planning Commission has mapped groundwater recharge areas for Washtenaw County. Using data from the Washtenaw County Soil Survey and from well logs, trained experts can determine areas where water flows quickly through soil, there is a high degree of highly permeable sand and gravel particles in the ground and where the water table is high. In these areas, the risk of groundwater contamination is high. Areas not mapped by the WCMPC, but that may also serve as recharge areas, are those with highly permeable geology (sand and/or gravel) or soils, but that do not exhibit a high water table. These higher elevation areas also provide recharge waters to groundwater. The Township may ask for investigation and mapping of areas with highly permeable soils and geology.

H.3) Protection and Restoration Strategies

H.3.1) Development should be located away from groundwater recharge areas and wellhead protection areas as mapped by the WCMPC or otherwise identified. Where development occurs, impervious surfaces should be limited to the greatest extent possible. Land grading should be controlled to retain the water holding characteristics of the land. Vegetation essential to the water holding characteristics should be preserved, or, where necessary, enhanced as part of a development program. The balance and integrity of the hydrological system should be maintained in a proposed development.

H.3.2) Recharge areas should be protected from pollution by regulating the uses permitted within these areas and by controlling the quality of surface water runoff from tributary areas. Areas classified in the county soil surveys as having soils with water tables at or near the surface should also be protected from pollutant entry because of the ease with which pollutants on such soils can enter the underground water system.

- H.3.3)** Proper storage of hazardous substances will be paramount to protecting groundwater and the environment. Developments storing or handling hazardous substances should abide by the following groundwater protection standards:
- a) Hazardous substance storage areas must be designed to prevent spills and discharges to the air, surface of the ground, groundwater, lakes, streams, rivers or wetlands.
 - b) Secondary containment for above ground areas where hazardous substances are stored or used shall be provided. Secondary containment shall be sufficient to store the substance for the maximum anticipated time necessary for the recovery of any released substance.
 - c) General purpose floor drains shall be allowed only if they are authorized to be connected to a public sewer system, an onsite holding tank, or a system authorized through a state groundwater discharge permit.
 - d) State and federal agency requirements for storage, spill prevention, record keeping, emergency response, transport and disposal of hazardous substances shall be met. No discharge shall be allowed without required permits and approvals.

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